

10/019472

JC10 Rec'd PCT/PTO 20 DEC 2001

Practitioner's Docket No. 60680-1562

CHAPTER II

**TRANSMITTAL LETTER  
TO THE UNITED STATES ELECTED OFFICE (EO/US)  
(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)**

PCT/DE00/001972	15/June/2000	22/June/1999
INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED

GASKET AND METHOD OF PRODUCING A GASKET  
TITLE OF INVENTION

Lothar Quick  
APPLICANT(S)

**Box PCT**  
**Commissioner for Patents**  
**Washington D.C. 20231**  
**ATTENTION: EO/US**

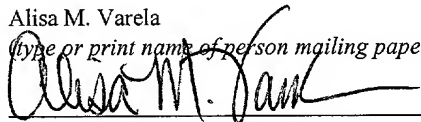
**NOTE:** To avoid abandonment of the application, the applicant shall furnish to the USPTO, not later than 20 months from the priority date: (1) a copy of the international application, unless it has been previously communicated by the International Bureau or unless it was originally filed in the USPTO; and (2) the basic national fee (see 37 C.F.R. § 1.492(a)). The 30-month time limit may not be extended. 37 C.F.R. § 1.495.

**WARNING:** Where the items are those which can be submitted to complete the entry of the international application into the

**CERTIFICATION UNDER 37 C.F.R. 1.10\***  
(Express Mail label number is **mandatory**.)  
(Express Mail certification is optional.)

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited with the United States Postal Service on this date **December 20, 2001**, in an envelope as "Express Mail Post Office to Addressee," Mailing Label Number EV 051007334 US, addressed to the: Commissioner for Patents, Washington, D.C. 20231, Attention: EO/US.

03/15/2002 AYILM07 00000001 180013 10019472  
Sale Ref: 00000001 DAW: 180013 10019472  
01 FC-970 890.00 CH

Alisa M. Varela  
(Type or print name of person mailing paper)  
  
Signature of person mailing paper

**WARNING:** Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

**\*WARNING:** Each paper or fee filed by "Express Mail" **must** have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).  
"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

Adjustment date: 03/13/2002 AYILM07  
01/07/2002 00000001 180013 10019472  
01 FC-950 1040.00 CR

*national phase are subsequent to 30 months from the priority date the application is still considered to be in the international state and if mailing procedures are utilized to obtain a date the express mail procedure of 37 C.F.R. §1.10 must be used (since international application papers are not covered by an ordinary certificate of mailing - See 37 C.F.R. §1.8.*

*NOTE: Documents and fees must be clearly identified as a submission to enter the national state under 35 USC 371 otherwise the submission will be considered as being made under 35 USC 111. 37 C.F.R. § 1.494(f).*

1. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. 371:
  - a. ☒ This express request to immediately begin national examination procedures (35 U.S.C. 371(f)).
  - b. ☒ The U.S. National Fee (35 U.S.C. 371(c)(1)) and other fees (37 C.F.R. § 1.492) as indicated below:

## 2. Fees

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
[X]*	TOTAL CLAIMS	2 - 20 =		x \$ 18.00 =	\$
	INDEPENDENT CLAIMS	2 - 3 =		x \$ 84.00 =	
	MULTIPLE DEPENDENT CLAIM(S) (if applicable) + \$280.00				
BASIC FEE**	<p>[ ] U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO:</p> <p>[ ] and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(2) to (4) have been satisfied for all the claims presented in the application entering the national stage (37 CFR 1.492(a)(4)) ..... \$100.00</p> <p>[ ] and the above requirements are not met (37 CFR 1.492(a)(1)) ..... \$710.00</p> <p>[X] U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO:</p> <p>[ ] has been paid (37 CFR 1.492(a)(2)) ..... \$740.00</p> <p>[X] has not been paid (37 CFR 1.492(a)(3)) ..... \$1,040.00</p> <p>[ ] where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5)) ..... \$890.00</p>				
	Total of above Calculations				= \$1,040.00
SMALL ENTITY	Reduction by ½ for filing by small entity, if applicable. Affidavit must be filed. (note 37 CFR 1.9, 1.27, 1.28)				-
	Subtotal				\$1,040.00
	Total National Fee				\$ 1,040.00
	Fee for recording the enclosed assignment document \$40.00 (37 CFR 1.21(h)). (See Item 13 below). See attached "ASSIGNMENT COVER SHEET".				
TOTAL	Total Fees enclosed				\$ 1,040.00

\*See attached Preliminary Amendment Reducing the Number of Claims.

- i. ☐ A check in the amount of \_\_\_\_\_ to cover the above fees is enclosed.  
 ii. ☒ Please charge Account No. 18-0013 in the amount of \$ 1,040.00.  
 A duplicate copy of this sheet is enclosed.

**\*\*WARNING:** "To avoid abandonment of the application the applicant shall furnish to the United States Patent and Trademark Office not later than the expiration of 30 months from the priority date: \* \* \* (2) the basic national fee (see § 1.492(a)). The 30-month time limit may not be extended." 37 C.F.R. § 1.495(b).

**WARNING:** If the translation of the international application and/or the oath or declaration have not been submitted by the applicant within thirty (30) months from the priority date, such requirements may be met within a time period set by the Office. 37 C.F.R. § 1.495(b)(2). The payment of the surcharge set forth in § 1.492(e) is required as a condition for accepting the oath or declaration later than thirty (30) months after the priority date. The payment of the processing fee set forth in § 1.492(f) is required for acceptance of an English translation later than thirty (30) months after the priority date. Failure to comply with these requirements will result in abandonment of the application. The provisions of § 1.136 apply to the period which is set. Notice of Jan. 3, 1993, 1147 O.G. 29 to 40.

3. ☒ A copy of the International application as filed (35 U.S.C. 371(c)(2)):

**NOTE:** Section 1.495 (b) was amended to require that the basic national fee and a copy of the international application must be filed with the Office by 30 months from the priority date to avoid abandonment "The International Bureau normally provides the copy of the international application to the Office in accordance with PCT Article 20. At the same time, the International Bureau notifies applicant of the communication to the Office. In accordance with PCT Rule 47.1, that notice shall be accepted by all designated offices as conclusive evidence that the communication has duly taken place. Thus, if the applicant desires to enter the national stage, the applicant normally need only check to be sure the notice from the International Bureau has been received and then pay the basic national fee by 30 months from the priority date." Notice of Jan. 7, 1993, 1147 O.G. 29 to 40, at 35-36. See item 14c below.

- a. ☒ is transmitted herewith.  
 b. ☐ is not required, as the application was filed with the United States Receiving Office.  
 c. ☐ has been transmitted  
     i. ☐ by the International Bureau.  
     ii. ☐ by applicant on \_\_\_\_\_.Date

4. ☒ A translation of the International application into the English language (35 U.S.C. 371(c)(2)):

- a. ☒ is transmitted herewith.  
 b. ☐ is not required as the application was filed in English.  
 c. ☐ was previously transmitted by applicant on \_\_\_\_\_.  
     Date  
 d. ☐ will follow.

5. ☐ Amendments to the claims of the International application under PCT Article 19 (35 U.S.C. 371(c)(3)):

**NOTE:** The Notice of January 7, 1993 points out that 37 C.F.R. § 1.495(a) was amended to clarify the existing and continuing practice that PCT Article 19 amendments must be submitted by 30 months from the priority date and this deadline may

*not be extended. The Notice further advises that: "The failure to do so will not result in loss of the subject matter of the PCT Article 19 amendments. Applicant may submit that subject matter in a preliminary amendment filed under section 1.121. In many cases, filing an amendment under section 1.121 is preferable since grammatical or idiomatic errors may be corrected." 1147 O.G. 29-40, at 36.*

- a. ☐ are transmitted herewith.
  - b. ☐ have been transmitted
    - i. ☐ by the International Bureau.  
Date of mailing of the amendment (from form PCT/IB/308): \_\_\_\_\_.
    - ii. ☐ by applicant on \_\_\_\_\_.  
Date
  - c. ☐ have not been transmitted as
    - i. ☐ applicant chose not to make amendments under PCT Article 19.  
Date of mailing of Search Report (from form PCT/ISA/210): \_\_\_\_\_.
    - ii. ☐ the time limit for the submission of amendments has not yet expired. The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.
6. ☐ A translation of the amendments to the claims under PCT Article 19 (38 U.S.C. 371(c)(3)):
- a. ☐ is transmitted herewith.
  - b. ☐ is not required as the amendments were made in the English language.
  - c. ☐ has not been transmitted for reasons indicated at point 5(c) above.
7. ☒ A copy of the international examination report (PCT/IPEA/409)
- ☒ is transmitted herewith.
  - ☐ is not required as the application was filed with the United States Receiving Office.
8. ☒ Annex(es) to the international preliminary examination report
- a. ☒ is/are transmitted herewith.
  - b. ☐ is/are not required as the application was filed with the United States Receiving Office.
9. ☒ A translation of the annexes to the international preliminary examination report
- a. ☒ is transmitted herewith.
  - b. ☐ is not required as the annexes are in the English language.
10. ☒ An oath or declaration of the inventor (35 U.S.C. 371(c)(4)) complying with 35 U.S.C. 115
- a. ☐ was previously submitted by applicant on \_\_\_\_\_.  
Date
  - b. ☐ is submitted herewith, and such oath or declaration
    - i. ☐ is attached to the application.
    - ii. ☐ identifies the application and any amendments under PCT Article 19 that were transmitted as stated in points 3(b) or 3(c) and 5(b); and states that they were reviewed by the inventor as required by 37 C.F.R. 1.70.
    - iii. ☒ will follow.

Other document(s) or information included:

11. ☒ An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):
  - a. ☒ is transmitted herewith.
  - b. ☐ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was searched by the United States International Searching Authority.
  - d. ☐ will be transmitted promptly upon request.
  - e. ☐ has been submitted by applicant on \_\_\_\_\_.  
Date
  
12. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98:
  - a. ☒ is transmitted herewith.  
Also transmitted herewith is/are:
    - ☒ Form PTO-1449 (PTO/SB/08A and 08B).
    - ☒ Copies of citations listed.
  - b. ☐ will be transmitted within THREE MONTHS of the date of submission of requirements under 35 U.S.C. 371(c).
  - c. ☐ was previously submitted by applicant on \_\_\_\_\_.  
Date
  
13. ☐ An assignment document is transmitted herewith for recording.  
  
 A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.  
  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
14. ☒ Additional documents:
  - a. ☒ Copy of request (PCT/RO/101)
  - b. ☒ International Publication No. WO00/79156 A1
    - i. ☐ Specification, claims and drawing
    - ii. ☒ Front page only
  - c. ☒ Preliminary amendment (37 C.F.R. § 1.121)
  - d. ☐ Other  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
15. ☒ The above checked items are being transmitted
  - a. ☒ before 30 months from any claimed priority date.
  - b. ☐ after 30 months.

16. ☐ Certain requirements under 35 U.S.C. 371 were previously submitted by the applicant on \_\_\_\_\_, namely:

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### AUTHORIZATION TO CHARGE ADDITIONAL FEES

**WARNING:** *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges if extra claims are authorized.*

**NOTE:** *"A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).*

**NOTE:** *"Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).*

☒ The Commissioner is hereby authorized to charge the following additional fees that may be required by this paper and during the entire pendency of this application to Account No. 18-0013.

☒ 37 C.F.R. 1.492(a)(1), (2), (3), and (4) (filing fees)

**WARNING:** *Because failure to pay the national fee within 30 months without extension (37 C.F.R. § 1.495(b)(2)) results in abandonment of the application, it would be best to always check the above box.*

☒ 37 C.F.R. 1.492(b), (c) and (d) (presentation of extra claims)

**NOTE:** *Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.492(d)), it might be best not to authorize the PTO to charge additional claim fees, except possible when dealing with amendments after final action.*

☒ 37 C.F.R. 1.17 (application processing fees)

☒ 37 C.F.R. 1.17(a)(1)-(5)(extension fees pursuant to § 1.136(a).

☐ 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

**NOTE:** *Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).*

**NOTE:** *37 C.F.R. 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the*

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*application . . . prior to paying, or at the time of paying . . . issue fee." From the wording of 37 C.F.R. § 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.*

- [X] 37 C.F.R. § 1.492(e) and (f) (surcharge fees for filing the declaration and/or filing an English translation of an International Application later than 30 months after the priority date).

Date: December 20, 2001



SIGNATURE OF PRACTITIONER

Customer No. 010291

Telephone No. (248) 594-0600

R0133684.DOC

Michael B. Stewart, Reg. No. 36,018  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Lothar Quick

Serial No.: To Be Assigned

Filed: Herewith

For: GASKET AND METHOD OF PRODUCING A GASKET

Box Patent Application  
Commissioner for Patents  
Washington, D.C. 20231  
ATTENTION: EO/US

PRELIMINARY AMENDMENT

Dear Sir:

Please amend the application as follows prior to examination on the merits.

IN THE CLAIMS

Please cancel claims 2 - 20 and 22 - 26 of the application.

Respectfully submitted,

Date: December 20, 2001

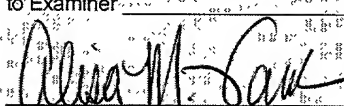
By:



Michael B. Stewart (Reg. No. 36,018)  
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Attorney for Applicant

Customer No. 010291

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CERTIFICATE OF MAILING/TRANSMISSION (37 CFR 1.8(a))	
I hereby certify that this correspondence is, on the date shown below, being:	
<input checked="" type="checkbox"/> deposited with the United States Postal Service with sufficient postage as Express Mail, Post Office to Addressee, Mailing label no.: <b>EV 051007334 US</b> , addressed to Box Patent Application, Commissioner for Patents, Washington, DC 20231, ATTENTION: EO/US.	<input type="checkbox"/> transmitted by facsimile to the Patent and Trademark Office to Examiner _____ at _____
 Signature	
Date: <b>December 20, 2001</b>	<b>Alisa M. Varela</b>

R0133723.DOC

**THE UNITED STATES ELECTED OFFICE (EO/US)  
(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)**

**Patent Application for an invention entitled**

**GASKET AND METHOD OF PRODUCING A GASKET**

**By:**

**LOTHAR QUICK residing at  
Hauptstrasse 44  
DE-89278 Nersingen  
GERMANY**

**Prepared by:**

**Michael B. Stewart  
Registration No. 36,018  
Attorney Docket No.: 60680-1562  
Customer No.: 010291  
Rader Fishman & Grauer, PLLC  
39533 Woodward Avenue, Suite 140  
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(248) 594-0600**

VERIFICATION OF TRANSLATION

Re: International Patent Application PCT/DE00/01972  
"Flachdichtung und Verfahren zum Herstellen einer  
Flachdichtung"  
" Gasket and method of producing a gasket"

I, Helen Ritchie Muir of 1 Babbington Gardens, Dumfries DG2  
9JB, Scotland, am the translator of the above-referenced  
publication and amended pages thereof and I declare that to  
the best of my knowledge and belief, the following is a true  
and accurate translation of the German text.

Helen R. Muir  
-----  
(Helen R. Muir)

Dumfries/Scotland,  
Date: 12th November 2001

1/PRTS

10/019472  
531 Rec'd PCT. 20 DEC 2001

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#### Gasket and method of producing a gasket

The invention relates to a gasket having at least one metallic layer, in which at least one gasket opening and at least one bead are formed, and in and/or adjacent to such a bead a coating is applied as a deformation limiter (stopper), the coating comprising at least one filler and one bonding agent, as well as to a method of producing such a gasket. Such a gasket can be used by preference as a cylinder head gasket for internal combustion engines.

20 In gaskets which are formed from one or even more metallic layers disposed the one above the other, it is usual to form beads by deformation, in order to improve the sealing effect, especially in the critical regions in which apertures are arranged for the cylinder bores  
25 but also other apertures through which bolts, lubricant or coolant are led. In order to prevent too strong a

compression or displacement of such beads as a result of the clamping forces acting during assembly, it is usual to form or arrange at or on individual metallic layers of such a gasket deformation limiters, also  
5 called spring limiters or stoppers.

To form such a deformation limiter, besides the bending over of a metallic layer in a region in the proximity of such a bead, in EP 0 797 029 A1 reference is made to another possible way of forming such a deformation  
10 limiter. There it is proposed that the deformation limiter be configured in the form of a raised portion, and for this purpose a sufficiently temperature-stable thermosetting material is used as the transport medium and bonding agent with the addition of at least one  
15 mineral filler, with a low thermal expansion coefficient. These components are intended to form a heavy-duty and resilient framework, with which it is possible to counteract any undesired excessive deformation in the bead region. It is proposed here  
20 that the bonding agent and such a filler (quartz powder, rutile, dolomite or wollastonite) should be used in equal proportions, more favourably however in the ratio 1:3 filler to bonding agent.

This means that the bonding agent has to be so selected  
25 that it not only withstands increased temperatures but also has sufficient strength to be able to withstand the pressures and compressive forces and the oscillations which occur for example in internal combustion engines, since the proportion of filler is  
30 correspondingly limited. This aspect becomes more and more important since modern combustion engines are operated at higher combustion pressures and correspondingly also higher temperatures and with higher demands of a gasket.

Since organic binders, as also the mineral fillers, have relatively poor heat conductivity, the deformation limiters so produced hinder heat transfer and this can lead to undesired temperature gradients on such a gasket.

This disadvantage can, however, also not be easily overcome by using metal powders as the filler, as is proposed in US 5,582,415, if the known bonding agent:filler proportions are maintained. Such a metal powder as the filler is moistened during a corresponding application all over by the organic bonding agent, the fissured surface structuring of such metal powders also having a disadvantageous effect and the largest number of the individual metal powder particles being thermally insulated from one another by the organic bonding agent.

The object of the invention, therefore, is to provide a gasket having at least one metallic layer, in which at least one gasket opening and at least one bead are formed, with deformation limiters, the strength of which is increased and the temperature properties of which are improved.

According to the invention, this object is achieved with the features of claim 1 for a gasket and the features of claim 21 for a method of producing such a gasket. Advantageous embodiments and developments of the invention arise with the features mentioned in the subordinate claims.

In the invention, deformation limiters are also formed by the application of a coating which contains at least one filler and one bonding agent. However here an increased proportion of filler is used, the mass proportion of which is greater than the proportion of bonding agent. Furthermore a filler in particle form

is used, the individual particles of which have a small surface in relation to the volume of the particle, such that in the finished coating tight packing of the individual particles of the filler can be achieved and  
5 a relatively large number of these particles adjoin one another directly, such that they support one another directly and the bonding agent used must substantially ensure the connecting function for the filler and the applied coating, whereas the pressures and compressive  
10 forces are substantially borne by the filler in particle form.

The spherical filler particles used should, in contrast to conventional powder-form materials, have a smoothed surface, the edges of which at least are rounded. It  
15 is certainly most propitious to use spherical particles since they are known to be able to achieve the smallest surface:volume ratio. When such a filler is used, good processability is provided, especially during application.

As already mentioned, the proportion of filler should be greater than the proportion of bonding agent, improved properties being easily achieved from ratios of 2:1, i.e. 1/3 bonding agent and 2/3 filler, upwards. The proportion of filler should advantageously be  
20 further increased and filling amounts of above 90% by mass of such a filler can be achieved, the desired properties being able to be further improved with the increased proportion of filler.  
25

The individual particles of the filler used should have average grain sizes in the range between 5 and 100  $\mu\text{m}$ , it being necessary for at least 80% of the particles to be in this grain size range.  
30

To improve the properties of the finished coating, it can moreover be propitious to use particles of

differing grain size so that tighter packing of the individual particles and correspondingly higher degrees of filling can be achieved, since smaller particles can fill the spaces between larger particles.

- 5 As filler materials, metals, metal alloys, glass but also ceramics and mixtures thereof can be used, silicon nitride or silicon carbide being advantageously used as ceramics taking into account their heat conductivity.

A suitable filler is a copper/tin alloy.

- 10 As a suitable bonding agent can be used a thermosetting material, for example an epoxy resin, a silicon resin or a polyamide resin, especially an epoxy resin based on bisphenol A; on account of the lowered strength requirements, a bonding agent can also be selected  
15 which can be optimised in the direction of temperature resistance and increased bonding agent function.

- In the initial material for the coating to be applied, at least one thermoplastic addition can also be contained which, for example, improves the  
20 processability of a prepared mixture. Such an addition can be for example a PTFE, polyethylene, polypropylene or a polyamide.

- For the processability, especially during the application of the coating, it is propitious to use a  
25 bonding agent which already has plastic deformability at room temperature. For this purpose some of the possible thermosetting materials already mentioned are very suitable. Another criterion for the selection of such a plastics material is the glass-transition  
30 temperature. It should advantageously be above 150°C in order to make allowance for the temperature conditions occurring at an internal combustion engine.



Since the brittleness of the initial materials selected for the coating is low, these can be easily applied even before the stamping process for forming the beads.

5 The coating forming the deformation limiter can be applied as lines in the form of a closed line but also in the form of an interrupted line. The lines can be varied in width, height and/or shape, according to requirement. The coating can be arranged adjacent to a bead, but also directly in a bead or respectively in a  
10 multi-layer gasket on a layer in the region of a bead which is formed in the adjacent layer.

If the coating is arranged in the bead, this bead can be crimped again on the outside, so that a bulge extends into the bead.

15 The coating, as the deformation limiter can however also be applied on opposite sides of a layer of a gasket, or respectively a bead, in order to ensure the deformation-limiting effect.

Especially when the coating has been applied in a bead,  
20 it can be advantageous so to configure the coating that the surface of the coating pointing to the outside comprises substantially bonding agent and/or a thermoplastic addition so that such a surface is configured more even and ensures more favourable  
25 sliding properties. For this purpose, however, a thin sealing layer can also be formed in addition.

During the production of a gasket according to the invention, the deformation limiter or limiters can be formed by the application of a mixture, containing the  
30 components mentioned already, to a metallic layer, this being followed generally by a hardening process in which the hardening is carried out by means of an energy input, e.g. during heat treatment.

The prepared mixture can be applied for example by means of a printing method, such as matrix printing or screen printing, the width and thickness of the coating during screen printing being able to be especially easily set by corresponding configuration and dimensioning of the screen used.

The invention is described below by way of example. The figures show:

- Fig. 1 a portion of a metallic layer of a gasket with deformation limiters formed on both sides of a bead;
- Fig. 2 a deformation limiter formed inside a bead;
- Fig. 3 a deformation limiter formed in a bead, with counter-bead and
- Fig. 4 a deformation limiter formed on a flat portion of a metallic layer, which limiter engages in the assembled state in a bead which is formed in an adjacent layer.

In Fig. 1 is represented a plurality of different possible arrangements for spring limiters which are applied in the form of a coating 2 to a metallic layer 1. Thus it can be recognised that on both sides of a bead 3, lying opposite one another, a coating 2 can be disposed as a deformation limiter. On their own or in addition, coatings 2 can be applied to the other side of the metallic layer 1. The coatings 2 as deformation limiters can extend until almost directly up to a gasket opening.

The thickness of such a coating 2 can be in the range between 20 and 300  $\mu\text{m}$ .

If a coating 2 is applied inside a bead 3 on a metallic layer 1, as is illustrated in Fig. 2, the coating can have a thickness in the range between 30 and 250  $\mu\text{m}$ , it being possible for the thickness of the coating 2 to be smaller than the actual depth of the bead 3.

In the example shown in Fig. 3, again a coating 2 is applied inside a bead 3, it being possible to recognise in this example that an additional bead 5 is present on the outer side, such that a bulge extends in the direction of the interior of the bead 3. This has proved to be advantageous since in this way a better sealing effect is produced.

In the example represented in Fig. 4, two metallic layers 1 and 4 of a gasket are illustrated, there being applied to metallic layer 4 a coating 2 which, in the assembled state of such a multi-layer gasket, can engage in a bead 3 which is formed in the adjacent layer 1. The coating 2 can be of such dimensions that it fills the bead 3 in layer 1 completely, but also only partially. Instead of bead 3, a corresponding depression in layer 1 can be formed which is otherwise not deformed in the shape of a bead.

### Patent claims

1. Gasket having at least one metallic layer in which at least one gasket opening and at least one bead are formed, and in and/or adjacent to the bead a coating is applied as a deformation limiter, which comprises at least one filler and one bonding agent,  
**characterised in that**  
 the mass proportion of the filler is greater than the proportion of bonding agent and the filler is present in particle form, the individual spherical particles having a small surface in relation to the volume of the particle.
2. Gasket according to claim 1, **characterised in that** the particles have a smoothed, rounded surface.
3. Gasket according to claim 1 or 2, **characterised in that** the particles are spherical.
4. Gasket according to one of claims 1 to 3, **characterised in that** at least 80% of the particles have an average grain size in the range between 5 and 100  $\mu\text{m}$ .
5. Gasket according to one of claims 1 to 4, **characterised in that** the particles consist of a metal, an alloy, resin or ceramics or mixtures thereof.
6. Gasket according to claim 5, **characterised in that** the filler consists of a copper/tin alloy.
7. Gasket according to one of claims 1 to 6, **characterised in that** a mass ratio of filler to bonding agent of at least 2:1 is maintained.

8. Gasket according to one of claims 1 to 7,  
**characterised in that** the filler is contained in  
the coating (2) with a mass proportion  $\geq 90\%$ .
- 5 9. Gasket according to one of claims 1 to 8,  
**characterised in that** the bonding agent is a  
thermosetting material.
10. Gasket according to claim 9, **characterised in that**  
the thermosetting material is selected from epoxy  
resin, silicon resin and polyamide resin.
- 10 11. Gasket according to claim 9, **characterised in that**  
the thermosetting plastic is an epoxy resin based  
on bisphenol A.
12. Gasket according to one of claims 1 to 11,  
**characterised in that** at least one thermoplastic  
15 addition is also contained.
13. Gasket according to claim 12, **characterised in**  
**that** the addition(s) is(are) selected from PTFE,  
PE, PP and PA.
14. Gasket according to one of claims 1 to 13,  
20 **characterised in that** the coating (2) is applied  
in lines.
15. Gasket according to one of claims 1 to 14,  
**characterised in that** the coating (2) is applied  
in the form of a line of differing width and/or  
25 height and/or shape.
16. Gasket according to one of claims 1 to 15,  
**characterised in that** the coating (2) is applied  
to two facing sides of a metallic layer (1).

17. Gasket according to one of claims 1 to 16,  
**characterised in that** the coating (2) is applied  
on a metallic layer (4) in the region of a bead  
(3) of a second metallic layer (1).
- 5 18. Gasket according to one of claims 1 to 17,  
**characterised in that** the coating (2) is applied  
on two facing sides of a bead (3).
19. Gasket according to at least one of claims 1 to  
18, **characterised in that** the coating (2) is  
10 arranged in a bead (3).
20. Gasket according to one of claims 1 to 19,  
**characterised in that** the surface of the coating  
(2) comprises substantially the bonding agent  
and/or a thermoplastic addition, or is provided  
15 with an additional sealing layer.
21. Method of manufacturing a gasket having at least  
one metallic layer, in which at least one gasket  
opening and at least one bead are formed, and in  
20 and/or adjacent to the bead a coating is applied  
as a deformation limiter,  
**characterised in that**  
a mixture containing at least one filler and one  
bonding agent is applied to a metallic layer (1,  
25 4), the mass proportion of filler being greater  
than the proportion of bonding agent, and a filler  
in particle form is used, the individual particles  
of which have a small surface in relation to the  
volume of the particle; and the applied coating  
30 (2) is hardened.
22. Method according to claim 21, **characterised in  
that** the mixture is hardened by energy input.

23. Method according to claim 21 or 22, **characterised in that** a mixing ratio of filler to bonding agent is set with a mass proportion of at least 2:1.
- 5 24. Method according to one of claims 21 to 23, **characterised in that** at least one thermoplastic addition is also added to the mixture.
25. Method according to one of claims 21 to 24, **characterised in that** the mixture is printed onto the metallic layer (1, 4).
- 10 26. Method according to one of claims 21 to 25, **characterised in that** the mixture is hardened by means of heat treatment.

1/1

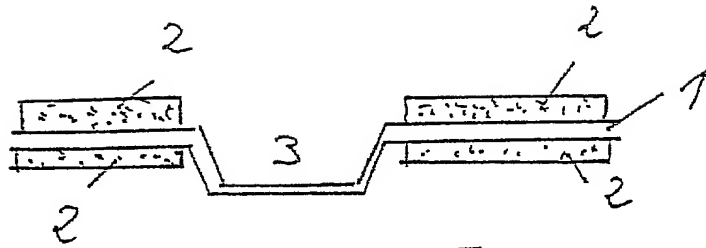


Figure 1

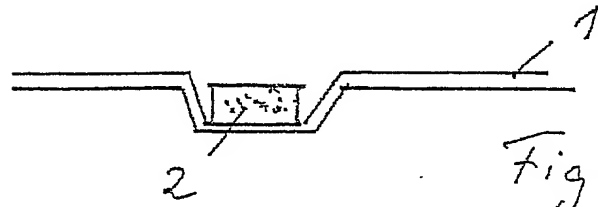


Figure 2

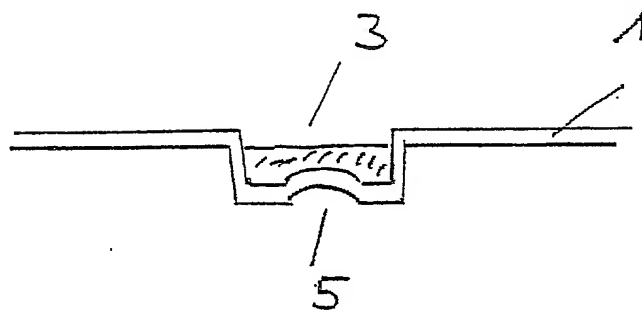


Figure 3

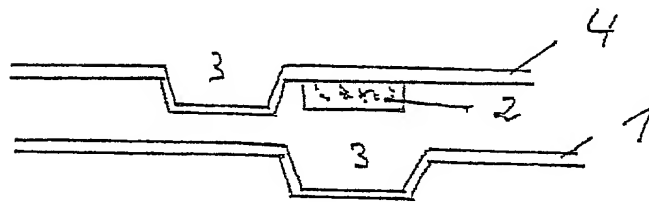
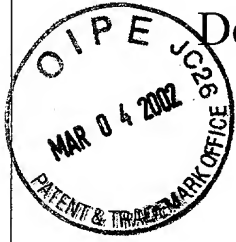


Figure 4





# Declaration and Power of Attorney for Patent Application

## Erklärung für Patentanmeldungen mit Vollmacht

### German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

daß mein Wohnsitz, meine Postanschrift und meine Staatsangehörigkeit den im nachstehenden nach meinem Namen aufgeführten Angaben entsprechen, daß ich nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent für die Erfindung mit folgendem Titel beantragt wird:

deren Beschreibung hier beigelegt ist, es sei denn (in diesem Falle Zutreffendes bitte ankreuzen), diese Erfindung

☒ wurde angemeldet am  
unter der US-Anmeldenummer oder unter der  
Internationalen Anmeldenummer im Rahmen des  
Vertrags über die Zusammenarbeit auf dem Gebiet  
des Patentwesens (PCT).

Ich bestätige hiermit, daß ich den Inhalt der oben angegebenen Patentanmeldung, einschließlich der Ansprüche, die durch einen oben erwähnten Zusatzantrag und in einem "preliminary amendment" abgeändert wurden, durchgesehen und verstanden habe.

Ich erkenne meine Pflicht zur Offenbarung jeglicher Informationen an, die eventuell zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, § 1.56 von Belang sind.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

### GASKET AND METHOD OF PRODUCING A GASKET

the specification of which is attached hereto unless the following box is checked:

☒ was filed on 12/20/01  
as United States Application Number or PCT  
International Application Number

10/019,472

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above and as amended in a preliminary amendment.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

**German Language Declaration**

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Title 35, US-Code, § 119 (a)-(d), bzw. § 365(b) aller unten aufgeführten Auslandsanmeldungen für Patente oder Erfinderurkunden, oder §365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslandsanmeldungen für Patente bzw. Erfinderurkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

I hereby claim foreign priority under Title 35, United States Code, §119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Applications  
(Frühere ausländische Anmeldungen)

Priority Not Claimed  
Priorität nicht beansprucht

☐

Number Country

Day/Month/Year Filed

☐

Ich beanspruche hiermit Prioritätsvorteile unter Title 35, US-Code, § 119(e) aller US-Hilfsanmeldungen wie unten aufgezählt.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

Application No. , filed on

Application No. , filed on

Ich beanspruche hiermit die mir unter Title 35, US-Code, § 120 zustehenden Vorteile aller unten aufgeführten US-Patentanmeldungen bzw. § 365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung nicht in einer US-Patentanmeldung, bzw. PCT internationalen Anmeldung in in einer gemäß dem ersten Absatz von Title 35, US-Code, § 112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind und die im Zeitraum zwischen dem Anmeldetag der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) gültigen internationalen Anmeldetags bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

Application No. , filed on

Status: patented/pending/abandoned)

Application No. , filed on

Status: patented/pending/abandoned)

Ich erkläre hiermit, daß alle in der vorliegenden Erklärung von mir gemachten Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissentlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**German Language Declaration**

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent- und Markenamt:

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Citizen of

**FOURTH NAMED INVENTOR**

Signature

Date

**P.O. ADDRESS and RESIDENCE**

Citizen of



If box is checked, subsequent inventors are listed on a separate sheet